

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of determining, particularly ~~in situ~~, physical, chemical and/or biological properties or state variables, particularly substance concentrations, temperature, pH and/or physical fields, and/or the change in physical, chemical and/or biological properties or state variables in an examination area of an examination object by determining ~~the a~~ change in ~~the a~~ spatial distribution of magnetic particles in ~~this the~~ examination area ~~or in parts thereof as a function of the effect of,~~ particularly ~~physical, chemical and/or biological, influencing~~ variables ~~on at least a part-area and/or in the, particularly~~ physical, chemical and/or biological, conditions in at least a part-area of the examination area, by means of the following steps, the method comprising the acts of:

[[a]] introducing into the examination area magnetic particles into at least part of the examination area in a first state in which in the examination area or in parts thereof or in a second state wherein, in the first state, at least some of the magnetic particles that are to be examined are agglomerated and/or coupled to one another in pairs or more, particularly covalently, ionically, coordinatively or via hydrogen bridge bonds or Van der Waals bonds, in particular are at least partially restricted in terms of their freedom of movement, or introducing magnetic particles into at least part of the examination area and wherein, in a the second state in which, the particles are deagglomerated and/or decoupled and can be agglomerated and/or coupled;

[[b]] generating a magnetic field having a strength with a spatial profile of the magnetic field strength such that there is produced in the examination area two part-areas including a first part-area having a low magnetic field strength and a second part-area having a higher magnetic field strength, strength than the low magnetic field strength;

[[c]] changing the, in particular relative, spatial position positions of the two part-areas in the examination area or changing

the magnetic field strength in the first part-area to cause the change in the spatial distribution of magnetic particles so that the magnetization of the particles is locally changed, changed;

[[d]] detecting signals that depend on the magnetization in the examination area that is influenced by this change, and the changing act;

[[e]] evaluating the signals so as to obtain information about the change in the spatial distribution of the magnetic particles and/or and about physical, chemical and/or biological state variables and/or the change therein in the examination area, wherein the physical, chemical and/or biological state variables include at least one of substance concentration, temperature, pressure, viscosity and pH; and

correlating the change in the spatial distribution of the magnetic particles in the examination area with at least one a local concentration, temperature, pressure, viscosity and pH value.

2. (Currently Amended) A The method as claimed in claim 1, characterized in that at least those state variables in which magnetic particles pass from the first state pass to the second

state are detected in an examination area, in particular by the relative arrangement of the magnetic particles changing toward a wherein the detecting act includes detecting change of the magnetic particles from the first state to the second state including deagglomeration and/or decoupling of coupled individual magnetic particles and/or by the detecting increased distance between individual magnetic particles assuming on average a greater distance from one another, or in which the magnetic particles pass from said second state to said first state.

3. (Currently Amended) A The method as claimed in claim 2, characterized in that the claim 1, passing of the magnetic particles from the first state to the second state and/or from the second state to the first state takes place thermally, by means of wherein the detecting act includes detecting passage of the magnetic particles between the first state and the second state, the passage being due to at least one of heat, radiation, acid, base, electrical or magnetic fields, ultrasound and/or enzymatically and/ an enzyme.

Claim 4 (Canceled)

5. (Currently Amended) AThe method as claimed in claim 1,
characterized in that according to a first state further comprising
the act of spatially delimiting the agglomerated and or coupled-
together magnetic particles are in a spatially delimited, solid or
viscous in a medium which can be physically, chemically and/or
biologically modified, dissolved and/or degraded.

6. (Currently Amended) AThe method as claimed in claim 5,
characterized in that wherein the medium comprises polysaccharides,
starch, in particular dextrans or cyclodextrans, waxes, oils, fats
or gels.

7. (Currently Amended) AThe method as claimed in claim 5,
characterized in that the medium comprises microorganisms, in
particular bacteria.

8. (Currently Amended) AThe method as claimed in claim 1,
characterized in that further comprising the act of providing the

agglomerated magnetic particles in the agglomerated or coupled-together state are located in the region of the on a surface of a particulate, in particular liquid or gaseous, medium.

9. (Currently Amended) A The method as claimed in claim 1, characterized in that further comprising the act saturating the magnetic particles become saturated upon by application of an external magnetic field, in particular having a strength of about 100 mT or less.

10. (Currently Amended) A The method as claimed in claim 1, characterized in that the magnetic particle is a wherein the magnetic particles multidomain or monodomain particle particles, and further comprising the act of reversing the magnetization of which can be reversed the multidomain or monodomain particles by means of Neel's rotation and/or by means of Brown's rotation.

11. (Currently Amended) A The method as claimed in claim 1, characterized in that wherein the magnetic particle is a particles are hard-magnetic or soft-magnetic multidomain particle particles.

12. (Currently Amended) A method as claimed in claim 1,
~~characterized in that wherein the magnetic particle is a particles~~
~~are monodomain particle the magnetization of which is reversed by~~
~~Neel's and Brown's rotation particles, or a soft-magnetic~~
~~multidomain particle particles of asymmetric shape, the method~~
~~further comprising the act of reversing the magnetization of the~~
~~monodomain particles by Neel's and Brown's rotation.~~

13. (Currently Amended) A ~~The~~ method as claimed in claim 1,
~~characterized in that first further comprising the acts of:~~
~~binding magnetic particles, bound to at least one functional~~
~~binding unit, in particular units including at least one of a~~
~~functional group, a DNA sequence, an RNA sequence, and/or and~~
~~an aptamer, and at least second magnetic particles, bound to at least~~
~~one functional binding unit, in particular a functional group, a~~
~~DNA sequence, an RNA sequence and/or an aptamer, are present in~~
~~and/or introduced into the examination area and in that there is~~
~~present in and/or is introduced ; and~~
~~introducing into the examination area at least one compound~~

which has at least a first complementary functional binding unit,
in particular units including at least one of a complementary
functional group, a complementary DNA sequence, a complementary RNA
sequence and/or, and a complementary aptamer sequence, that
interacts in a binding manner with at least one functional binding
unit of the first magnetic particles and which has at least a
second functional binding unit, in particular a functional group, a
complementary DNA sequence, a complementary RNA sequence and/or a
complementary aptamer sequence, that interacts in a binding manner
with at least one functional binding unit of the second magnetic
particles.

14. (Currently Amended) A method as claimed in claim 1,
characterized in that the evaluation takes place by means of the
following steps wherein evaluating act further comprises the acts
of:

[[a]] selection selecting of a path for the movement of the
first part-area having a low magnetic field strength within the
examination area,

[[b]] recording of reference data by means of using reference

samples along the path ~~according to a)~~ at at least one location, in particular a number of locations, and in the case of at least two locations, in particular a number of, recording external parameters using at least a first receiving coil,

[[c]] interpolation and/or extrapolation of at least one of interpolating and extrapolating the recorded reference data recorded in b) in respect of points and external parameters not recorded in step b),

[[d]] measurement of measuring the path within the examination area in a sequence that is identical or substantially identical to that used for the recording of data by means of the reference samples according to b) via a coil arrangement including at least a one of the first and/or receiving coil and a second receiving coil, and

[[e]] comparison of the comparing the measured data obtained according to d) with the reference data according to b) and/or c), in particular by means of an error square minimization to obtain compared data.

15. (Currently Amended) A The method as claimed in claim 14,

~~characterized in that in a step c') that follows step c), further comprising the act of converting the reference data obtained in steps b) and/or c) are converted to the characteristics of at least a second receiving coil used for the measurement in step d) measuring act.~~

16. (Currently Amended) A The method as claimed in claim 14, characterized in that in a further step f) further comprising the act of assigning the compared data obtained by means of comparison in step e) are assigned the comparing act to a gray value for a pixel to give an image, with the relative pixel intensity representing the a degree of the determined external parameters determined by at least one of the recording act and the at least one of interpolating and extrapolating acts.

17. (Currently Amended) A The method as claimed in claim 16, characterized in that in a further step g) further comprising the act of displaying the images obtained in step f) are displayed image in a merged image.

Claim 18 (Canceled)

19. (Currently Amended) A the method as claimed in claim 14,
characterized in that further comprising one of the acts of:
moving the first part-area having a the low magnetic field
strength is moved by actuating and/or moving the coil arrangement
or in that in the case of a;
keeping stationary the first part-area having a the low
magnetic field strength while moving the examination object is
moved or in that ; and
moving simultaneously both the examination object and the
first part-area having a low magnetic field strength are moved
relative to one another at the same time.

Claims 20-40 (Canceled)

41. (New) The method of claim 1, wherein the act of changing
the magnetic field strength changes the magnetic field strength
temporally in a first frequency band, and the detecting act
includes detecting the signal in a second frequency band, the

PATENT

Serial No. 10/552,806

Amendment in Reply to Office Action mailed on July 20, 2009

second frequency band including harmonics of signals in the first frequency band.

42. (New) The method of claim 1, wherein the act of generating the magnetic field includes the act of first and second magnetic fields which change at different rates and with different amplitudes, wherein the first magnetic field changes slowly in time and with a higher amplitude relative the second magnetic field, and the second magnetic field changes rapidly in time terms and with a lower amplitude relative the first magnetic field.